

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

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APR 15 1993

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matters of)
)
Rulemaking to Amend)
Part 1 and Part 21 of the)
Commission's Rules to)
Redesignate the 27.5-29.5)
GHz Frequency Band and)
to Establish Rules and)
Policies for Local Multipoint)
Distribution Service;)
)
Applications for Waiver of)
the Commission's Common)
Carrier Point-to-Point)
Microwave Radio Service)
Rules;)
)
Suite 12 Group Petition)
for Pioneer's Preference;)
)
University of Texas -- Pan)
American Petition for)
Reconsideration of Pioneer's)
Preference Request Denial)
)

CC Docket 92-297
RM-7872; RM-7722
PP-22

To: The Commission

REPLY COMMENTS
OF
SUITE 12 GROUP

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SUMMARY

Suite 12 Group is gratified by the outpouring of support in the comments filed in this proceeding for the reallocation of the 28 GHz band as proposed in the Notice. Suite 12 reiterates its twin lodestars in this proceeding: (i) there must be no more than two licensees per market area, each with 1000 MHz of spectrum; and, (ii) LMDS will be a wireless, multifunction, two-way, broadband service, capable of providing much more than just a video distribution service.

In order to maximize frequency utilization without interference, the Commission must implement the following five concepts: (i) use of orthogonal polarization; (ii) the coordination of both polarization and type of service using that polarization; (iii) limiting the power of cell site transmitters to no more than +25 dBm per 20 MHz channel; (iv) limiting cell site transmitter antenna gain to no more than 14 dB; and (v) assuring interference protection for narrow beamwidth receive antennas only.

Those opposed to the use of orthogonal polarization cite no technical authority to substantiate their claim that polarization is not necessary for LMDS. These opponents ignore the technical conclusions of the Sarnoff Report attached to Suite 12's Petition for Rulemaking and the differences between LMDS and ordinary television.

Other opponents claim LMDS will be troubled by leaf attenuation; these opponents are ignorant of NTIA studies of such

attenuation at 28 **GHz** which state such attenuation is not a problem.

Other opponents do not believe that the FCC has enough data about LMDS technology to proceed with the rulemaking. The Sarnoff report as well as Suite 12's success in the marketplace provide the data sought **by** such opponents.

Several commenters, representing satellite and microwave interests oppose the reallocation for a variety of reasons. Most of these commenters mischaracterize the demand for Ka-band satellite services and the potential problem of earth station location which can be solved by locating earth stations in non-urban areas. Furthermore, several of these interests calculate potential interference from LMDS transmitters using a methodology which completely ignores the fact that the 28 **GHz** spectrum is currently allocated to point-to-point microwave. There is little chance of interference from LMDS transmitters into many of the satellites operated by these commenters.

Suite 12 continues to support the use of **BTAs**, construction benchmarks, the use of a post-card type lottery, 10 year license terms and the ability to lease LMDS frequencies.

Suite 12 opposes any effort to enact technology licensing regulations. The Commission has recognized that it has very limited, if any, authority in the patent area. Furthermore, nothing is broken in this area and no "**fix**" is required. Suite 12 has issued more than 150 technology licenses and has every intention of continuing to liberally license its technology. Suite 12 believes

that it is in its own economic best interests to continue to do so and no regulations, in this area, are needed.

Suite 12 continues to press its case for the reward due it in the form of a pioneer's preference in Los Angeles without the requirement to give up the Hye Crest license . No commenter opposed the grant of such a preference to Suite 12 and several commenters urged the Commission to grant such a preference. Suite 12's groundbreaking work at 28 GHz is worthy of a pioneer's preference. The Commission's condition that Suite 12 must surrender the Hye Crest license to get a preference in Los Angeles is based on the mistaken notion that the Hye Crest technology and operation are completely fungible with LMDS technology. They are not.

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To: The Commission

REPLY COMMENTS OF SUITE 12 GROUP

Suite 12 Group ("Suite 12"), by its attorneys, pursuant to § 1.415(c) of the Commission's rules, hereby respectfully submits its Reply Comments to those comments filed in response to the Commission's Notice of Proposed Rulemaking, Order, Tentative Decision and Order on Reconsideration in the above-styled proceeding (the "Notice").

I. INTRODUCTION

1. Suite 12 was very gratified to see the unqualified support expressed in the vast majority of comments to reallocate the 28 GHz band for Local Multipoint Distribution Service ("LMDS"). Suite 12's innovation and experimentation at 28 GHz has demonstrated that its working technology can transform the currently fallow 28 GHz band into an extremely productive, spectrally efficient, low power, two-way transport system capable of operating with various modulation techniques by using small-aperture, high-gain, narrow-beamwidth antennas and orthogonal polarization isolation techniques. The only real opposition to the reallocation comes from the current and potential fixed and low earth orbit (LEO) satellite interests, and some microwave interests. As demonstrated below, the concerns (related to harmful interference and lack of available spectrum) of these interests is misplaced. The proposed frequency spectrum reallocation for LMDS operations at 28 GHz reallocates a frequency band which is currently allocated for point-to-point microwave; therefore, such a reallocation certainly will not create any additional harmful interference in this band than is currently possible under the present allocation scheme.

2. There are two crucial points in this proceeding which not all commenters appeared to comprehend and which cannot be over-emphasized in connection with LMDS; namely: (1) the only way

a commercial LMDS licensee can be commercially viable is for that licensee to be allocated 1,000 MHz of frequency spectrum so that a level playing field vis-a-vis other technologies is created; and, (2) LMDS will be a wireless, multifunction two-way broadband service capable of providing much ~~more~~ than just a video distribution service; any attempt to "pigeonhole" the service as being primarily a video distribution service will have a detrimental impact on LMDS and will not enable LMDS to develop into its full potential.

II. FREQUENCY MANAGEMENT ISSUES

3. There is overwhelming support in the record for the Commission's proposal to reallocate the currently fallow 28 GHz frequency band for LMDS. The only real exception to this support is from some satellite and microwave interests. Commenters raised some questions concerning the specific details of the allocation; however, the vast majority of commenters encouraged the Commission to proceed with its proposed reallocation of the 28 GHz frequency band for LMDS operations. Suite 12, the pioneer of this technology, steadfastly adheres to its original position" on the issue that there must be no more than two licensees per market, each with 1,000 MHz, in order to provide a full range of services

^{1/} See Suite 12 Comments, pp. 7-10; See, also, Suite 12's Petition for Rulemaking, Rm 78-72, filed Sept. 24, 1991 ("Petition"), pp. 21-23.

and, in the case of a commercial licensee, in order to create an economically viable system. Suite 12 submits that nothing has been submitted in any of the comments which demonstrates that Suite 12's position on these issues is incorrect." Suite 12 also adheres to its position, as explained in detail in its comments at ¶¶ 13-20, that one of these 1,000 MHz be dedicated for non-commercial use.

4. The Commission should not limit the reallocation to only 1000 MHz for LMDS. As noted at ¶ 9 of Suite 12's Comments, each LMDS licensee requires 1000 MHz of spectrum as the minimum amount necessary to create a service that will be truly competitive. The Commission should not repeat the mistakes it made in creating DEMS or MMDS when it awarded inadequate spectrum for new licensees to compete with entrenched operators."

5. Suite 12 submits that a commercial licensee must have 1,000 MHz of frequency spectrum allocated in order to create a commercially viable wireless RF system capable of competing with wire systems. Such an allocation will provide a level playing

^{2/} Comments appear to be somewhat split on the number of licensees there should be in a market. However, many commenters agree with Suite 12 that there should be no more than two LMDS licensees per service area, given the already contested markets by CATV operators, multiple over-the-air broadcasters, video cassette and disk sales, and rental outlets.

^{3/} See Suite 12's Comments, n.13.

field for LMDS licensees such that they will be able to compete head-to-head with existing telecommunications facilities. For example, a typical cable system's "natural bandwidth" within the coaxial cable of 50 to 500 MHz can provide approximately 80 television channels. A standard LMDS natural bandwidth system can provide 50, 20 MHz television channels. This 1,000 MHz of spectrum is also necessary to compete with other video distribution technologies (e.g., Direct Broadcast Satellite, Video Dial Tone, Satellite Master Antenna Television), as well as to provide the requisite frequency spectrum for voice and data transmissions comparable to fiber optic cable.

6. Once the level playing field is created, and all technologies are at the same starting point, then new techniques, such as compression, available to all distribution methods can be relied upon to provide additional video channels at the option of the licensee. It should be emphasized that not everyone will want to make use of compression. While compression may be a viable technology for originating additional video channels," Suite 12 questions the ability of today's compression techniques to provide a picture equal in quality to the picture obtained when not

^{4/} See, e.g., Washington Post article, "D.C. Cable TV System Part of Major Fiber-Optic Plan," April 6, 1993, p. A-1, Col. 5, stating that the D.C. cable system is part of a plan to deliver 500 plus TV channels to offer "video on demand programming and interactive shopping services, and to transmit computer data and phone conversations."

employing compression; compression causes coding artifacts, whose acceptability by the public has not yet been demonstrated." Therefore, the Commission should not mandate the use of compression. Rather, the Commission should take those steps necessary to assure that every video technology is able to provide the best possible signal quality. This will become increasingly important in the future to accommodate the next generation of large screen televisions which will demand better signal quality in order to produce a high quality picture. Accordingly, whether or not to use compression should be a choice left to the operator. It would be unfair to force LMDS to use compression while allowing other video distribution services the flexibility of choice.

7. Norris' comments state that Suite 12 has not demonstrated that the bands currently allocated for MDS, MMDS and

^{5/} Compression is a significant concern to Suite 12 because Suite 12's system is designed for a "studio quality picture" in the fringe area of near S/N of 54 dB. This natural bandwidth performance is much better than anticipated performance with video compression with its corresponding S/N of less than 37 dB.

Unfortunately, compression employing the existing MPEG 1 standard results in rather poor picture quality, much poorer than studio quality. A signal to noise ratio, recommended by Kirouac and Bullock ("Video Conferencing," Satellite Communications Conference, 1983, p. 3.4.1) for use in video conferencing is:

26 inch monitor	45 dB S/N
4 foot screen	47 dB S/N
18 foot screen	49 dB S/N

Suite 12 believes that systems of the future will require a minimum of 49 dB S/N, and typically 54 dB. In fact, a recent FCC CATV specification recommended a minimum S/N of 43 dB.

ITFS are not adequate for local wireless distribution of broadcast programming. Suite 12 is unsure what Norris means by the term "adequate." If Norris means "adequate" for purposes of providing sufficient competition to existing video services, the Commission, at ¶ 16 of the Notice, would disagree with Norris' position. The Notice, at ¶ 16, states:

A new source of competition for franchised cable companies, wireless cable companies, and other video service providers furthers our goal of using the disciplines of the marketplace to regulate the price, type, quality and quantity of video services available to the public. Accordingly, we propose to redesignate the 28 GHz band fixed service allocation to any video or telecommunications use on either or both the vertical and horizontal polarization planes of the assigned frequency, which the public may require in a particular location.

Clearly, the Commission does not believe that the bands currently allocated for MDS, MMDS and ITFS are sufficient for local wireless distribution of broadcast programming.

8. United States Telephone Association ("USTA") and Digital Microwave Corporation ("DMC"), claim that at least some part of the 28 GHz band will be needed for point-to-point communications and should not be used for LMDS.^{6/} Suite 12 disagrees. There is presently more than ample microwave spectrum available in other bands for point-to-point use, and current technical standards could be made more stringent to provide for increased efficiency

^{6/} USTA Comments at p. 5.; DMC Comments at p.6.

in the use of those bands." USTA indicates that there were 7,600 point-to-point microwave licensees at 23 GHz throughout the United States. It is interesting to compare this number with the Sarnoff Report submitted in support of Suite 12's Petition for Rulemaking, which states, at p. 120, that in the present 18, 21, and 30 GHz bands (4,600 MHz of bandwidth) 29,072 FM or digital radios, each with a beamwidth of 50 MHz, can coexist in a 9 square mile area (which is less than one of Suite 12's LMDS cells.) Projecting this number throughout the entire land mass of the continental United States results in the fact that 10 billion such radios

^{7/} Apart from 28 GHz, the following frequency bands are available today for short haul point-to-point microwave use: 17.7-19.7 GHz ("18 GHz"), 21.2-23.6 GHz ("23 GHz"), 31.0-31.3 GHz ("31 GHz") and 38.6-40.0 GHz ("38 GHz"). The 18 GHz band is becoming heavily used. The 23 GHz is fairly heavily used by private (Part 94) licensees but lightly used by common carrier (Part 21) licensees; as a result, the 21.2-21.8 GHz and 22.4-23.0 GHz portions of the band are nearly vacant. The 31 GHz band is almost totally vacant, and we believe that there is only one manufacturer now supplying equipment for this band. The 38 GHz band is either totally or virtually unused, although a few licenses have been granted within the past year.

Moreover, the 23 GHz band is used inefficiently. Unlike lower frequencies, there is no requirement that digital systems comply with a 1 bit/sec/Hz spectral efficiency standard at 23 GHz. The channel plan, consisting of channels 50 MHz wide, is inefficient. It forces the use of a full 50 MHz channel to carry a: (i) T-1 (1.544 Mbit/sec) data channel that could easily be carried in 5 MHz; or, (ii) a video channel that could be carried in 25 MHz. In addition, the frequency stability requirement of 0.03% is a factor of 10 less stringent than is required at 18 GHz. The Commission could easily double the capacity of the 23 GHz band by adopting tighter technical standards.

could be used.^{8/} Clearly, there is no shortage of spectrum for point-to-point radios.

9. Other parties have suggested various assignment schemes within the LMDS allocation. For example, EM1 suggests 4 licensees per market, two with 750 MHz for video services and two with 250 MHz for voice and data services.^{9/} UTC proposes 4 licensees per market, each with 500 MHz of spectrum. GTE requests a separation between video and non-video services, for "regulatory purposes," and USTA believes that 1,000 MHz per licensee is excessive and suggests that only 1,000 MHz of spectrum should be allocated for the entire LMDS service. As the discussion above clearly indicates, the allocation of less than 1,000 MHz for an LMDS licensee would not provide adequate spectrum, would not create a level playing field, and would call into question the commercial viability of the service such that it may never get started, much less develop to its full potential.

III. TECHNICAL ISSUES

^{8/} It must also be noted that the 28 GHz LMDS facilities can serve the function of a point-to-point system in providing, for example, a backbone for PCS or short haul facilities for Asymmetric Digital Microcell Link ("ADML") or the "last mile" of fiber optics to the home.

^{9/} It should be noted that EM1 is in the business of providing point-to-point radios. Therefore, its comments may reflect an effort to protect its own business rather than enhance the public interest by encouraging the more effective use of the frequency spectrum.

A. Minimum Technical Recruiirements

10. Suite 12 endorses the concept espoused in many comments that only technology neutral rules should be adopted for LMDS. However, Suite 12 submits that the Commission must adopt certain minimum basic rules to ensure maximum spectral efficiency and to limit the potential for interference between LMDS licensees.

11. In order to assure utilization of the frequency spectrum in the most efficient manner possible, while limiting potential interference between LMDS licensees in adjacent or the same markets, five basic concepts must be implemented by FCC rule, namely: (1) the use of orthogonal polarization^{10/}; (2) the coordination of both polarization and type of service using that polarization^{11/}; (3) limiting the output power of cell site transmitters to no more than +25 dBm per 20 MHz channel; (4) limiting cell site transmitter antenna gain to no more than 14 dB; and, (5) assuring interference protection for narrow beamwidth receive antennas only.^{12/}

^{10/} This will not result in any expense being incurred for the construction or operation of an LMDS system; and cross-polarization is essential in reducing potential interference to satellite services, see discussion infra.

^{11/} See Suite 12 Comments at ¶ 14.

^{12/} Suite 12 believes that minimum standards should apply to the system. However, there are conditions which interference from band B into band A will occur. Clearly, the worst case is when the
(continued...)

utilizing the suggested concepts would far outweigh the minimal expense involved in complying with the suggested requirements.

13. In its comments, Motorola suggests a four cell reuse pattern. Suite 12 believes this approach is extremely spectrally inefficient because the full 1,000 MHz of spectrum will not be available for use and reuse in each cell. A four cell reuse for omnidirectional receivers will use 6 sector cells or 3 sector cells with carefully designed and engineered antenna patterns. Suite 12's approach, on the other hand, allows for the total reuse of the 1,000 MHz of spectrum in every cell (adjacent or otherwise) without interference because the I/N is greater than -3dB.

B. Orthogonal Polarization

14. The Wireless Cable Association ("WCA") erroneously claims that cross-polarization isolation will not work to provide

the interference isolation Suite 12 has experienced.^{14/} WCA cites articles in Broadcasting Magazine and the New York Times in support of its claims.^{15/} Not surprisingly, WCA fails to cite any technical journal or engineering textbooks to support its claims. WCA asserts that multipath reflections at 28 GHz will "cause the 'ghosts' that have always marred ordinary broadcast television."^{16/} WCA's assertions ignore the most significant and basic difference between LMDS and ordinary television: LMDS is based on FM modulation, which rejects interfering signals such as multipath reflections, while ordinary television employs AM modulation which receives and displays multipath interference as ghosts. Most importantly, WCA has ignored the technical conclusions of the Sarnoff Report attached to Suite 12's Petition for Rulemaking which, at page v, states: "Rain depolarization, fade margins and multipath are not a problem for short range millimeter wave propagation and reception by antennas that have narrow beamwidths."

^{14/} WCA Comments pp.6-9. The fact that Suite 12 has successfully experimented with this technique for years and that Hey Crest uses it commercially is ample evidence to prove this claim is erroneous.

^{15/} Id. at p. 8. It is important to note that the materials cited do not refer to quotations from people who actually witnessed demonstrations, but rather people who were speculating about potential problems. See, Appendix 1, "Comments In The Press Concerning Suite 12's Demonstrations" attached hereto.

^{16/} Id.

15. Moreover, the bold assertion of WCA that the bouncing of signals off various objects may cause a shift in polarization is totally invalid with relation to millimeter wave transmissions. If this were true, radar would not work properly. Suite 12's experimentation over the past several years has taken advantage of the "bounce" phenomenon and has never experienced a shift in polarization (i.e., horizontal to vertical or vice-versa), nor has it ever seen reference in a text book to a shift in polarization as a result of signal bounce, in millimeter wave transmissions. For examples of how the bounced signal performs, see Appendix 1, "Comments In The Press Concerning Suite 12's Demonstrations," attached hereto.

16. A number of identical comments submitted by the law firm of Maines & Harshman (the "Maines Group") propose that "adjacent area interference control should be based on a 20 dB desired-undesired ratio." ^{17/} This proposal is apparently a to be used instead of Suite 12's cross-polarization isolation and/or frequency offset between adjacent cells design. Suite 12 submits that cross-polarization is absolutely essential to avoid interference between the adjacent cells that cannot employ frequency offset. The Commission has recognized that cross-polarization isolation is an appropriate system design technique

^{17/} See, e.g., Comments of Faith C. Amby at p. 3.

for LMDS^{18/} and the Maines Group has not proposed any specific alternative approach. To the contrary, the Maines Group has proposed an inferior 20 dB D/U ratio as the primary design criterion. This is puzzling because under most circumstances, cross-polarization isolation can achieve a 30 dB D/U ratio or better, at no additional cost. Moreover, a 20 dB D/U ratio for FM video is likely to produce an inferior picture quality ("slightly annoying interference" or Grade 3 on the CCIR Impairment Scale)^{19/} while 30 dB is likely to produce a superior picture ("imperceptible interference" or Grade 5 on the CCIR Impairment Scale).

17. Because the LMDS system was designed to provide a 54 dB picture capable of clear "big screen" TV reception and low bit error rate (better than 1 part in 10 billion), it makes no sense to force it to perform poorer than the FCC specification of 43 dB for cable television. It should be noted that NASA, in its comments, requested an interference level of I/N = -10 dB. Suite 12's LMDS system meets that standard for interference into a satellite uplink, and Suite 12 submits that same standard should be applicable for interference into LMDS systems.

^{18/} Notice at ¶ 20.

^{19/} Groumpos and Dimitriadis, "The Effect of Variable S/N on the Subjective Evaluation of Protection Ratios for Direct TV Satellite Services," 1983 Satellite Communication Conference.

18. TEC disputes Suite 12's experience that cross-polarization will provide adequate isolation at 28 GHz frequencies. TEC's position is not credible. No technical report is provided to show the measurements that TEC claims to have made. There is no information about the company or its principals to confirm that it is "qualified to make constructive comments" on technical issues.^{20/} If TEC has actually made any measurements, they have apparently been made at lower frequencies.^{21/} Consequently, the Commission should disregard TEC's opposition to Suite 12's use of cross-polarization isolation for LMDS.

C. Attenuation

19. NASA claims that LMDS operating at 28 GHz will be troubled by attenuation through foliage.^{22/} It cites data indicating that signal loss through a tree will be 15-20 dB or more.^{23/} However, NASA's measurements are flawed because they are based on point-to-point microwave transmissions,^{24/} not on point-to-multipoint transmissions that will characterize LMDS.

^{20/} TEC Reply Comments at p.1.

^{21/} Id. at p. 2.

^{22/} NASA Comments at p. 16-17.

^{23/} Id. at p. 16.

^{24/} Measurements at L-band, where wavelengths could be 30 times greater than at 28 GHz, are simply not applicable to LMDS at 28 GHz.

With point-to-multipoint transmissions, there will be multiple transmission paths through foliage due to multiple scattering of the signal. While point-to-point links are blocked by trees, point-to-multipoint signals from wide beam antennas are scattered rather than blocked; measurements show that much of the scattered signal gets through. For example, in the "multiple scatter mode" the attenuation through foliage "averages only 0.05 dB loss per meter." ^{25/} Thus, there are "propagation holes" that provide paths through foliage for signals transmitted from wide beam antennas; there are no such paths for narrow beam transmissions.

20. In Suite 12's experience, 28 GHz loss through a window is less than 2 dB; through 3/4 inch plywood is less than 4 dB; and 2 3/8 inch sheetrock wall is about 2 dB. Customers located behind buildings receive reflected signals from side or rear buildings. In those areas where no natural reflective surfaces exist, simple passive or active solid state solar-powered repeaters could be installed to meet customer needs.

21. NASA's claims that LMDS will need clear weather fade margins of 30 dB and rain fade margins exceeding 30 dB ^{26/} are grossly in error. The clear weather fade margin, using the

^{25/} "Vegetation Loss Measurements at 9.6, 28.8, 57.6 and 96.1 GHz Through a Conifer Orchard in Washington State," NTIA Report 89-251 at p. 64.

^{26/} NASA Comments, p. 16.

traditional method of Vigants and Barnett^{27/} demonstrates the fade margin to be 0 dB for a 3 mile radius cell (see Appendix 2, Report of Roger Freeman, "Analysis of Multipath at 29 GHz" attached hereto). Rain fade of the New York City area, for a 99.9% availability, is 5.0 dB/mile, or 15 dB.^{28/}

D. Sufficiency Of Technical Data

22. The Wireless Cable Association International, Inc., ("WCA") argues that there is insufficient data upon which to reallocate the 28 GHz spectrum to LMDS. WCA's position is nothing but a rehash of the now shop-worn arguments WCA has placed before the Commission since Suite 12 filed its Petition for Rulemaking and Petition for Pioneer's Preference and it became obvious to WCA that LMDS was a threat to wireless cable operators.^{29/}

23. Similar to its prior opposition questioning the viability of Suite 12's system, WCA states there is a lack of test data on Suite 12's technology. Such a position is clearly erroneous. The report by David Sarnoff Laboratories ("Sarnoff Report"), attached to Suite 12's Petition for Rulemaking, provides

^{27/} K. Feher, Digital Communications, Prentice Hall, atp.97.

^{28/} Sarnoff Report, p.22.

^{29/} WCA also offered the same arguments in an Ex Parte letter to the Chairman of the FCC on February 12, 1992.

a comprehensive, technical description of the viability of Suite 12's technology based on tests thereof.^{30/} The Sarnoff Report articulates the reality of a technology that (i) is commercially available in New York City, (2) was demonstrated at the Sarnoff Labs for six months, (3) has undergone substantial field tests over a 4.2 mile radius in Asbury Park, New Jersey (two-way) and multiple cell configuration demonstrations in Freehold, New Jersey.

24. In addition, hundreds of companies and individuals have witnessed demonstrations of Suite 12's LMDS technology^{31/} and an overwhelming majority of them have felt sufficiently confident in the technical and market viability of the technology and have sought to be licensed by Suite 12 to use its technology to provide the service. Many of these companies also filed waiver applications seeking to be licensed by the FCC to provide this

^{30/} See, e.g., Sarnoff Report at p. vi ("All aspects of the Suite 12 cellular system have been demonstrated at Sarnoff."). It should be noted that Demonstrations of Suite 12's technology are now, and have been for some time, available in New York City. As stated in Suite 12's comments, it has "conducted hundreds of demonstrations of its system operations, including video distribution and various two-way voice, video, data and digital services." See Suite 12 comments at ¶ 4.

^{31/} Actual demonstrations include reception from a variety of "bounces," propagation through a 35 foot fully foliated elm tree, propagation on a non-line of sight basis, line of sight reception, and two-way voice video communications in the same frequency band using orthogonal polarization without affecting reception of the 49 channels of video in the same or adjacent apartments. Some comments from the press who have witnessed these demonstrations are contained at Appendix 1, attached hereto.

service. Furthermore, several foreign countries are seeking to allocate the 28 GHz band in their nations for LMDS which they would not do if they had questions about the viability of the technology.

25. WCA's insistence on seeing test data is not supported by FCC precedents; the Commission has never required WCA's requested level of data before creating a new service. It is ludicrous for WCA to suggest that the Commission cannot proceed, or ought not to proceed, to reallocate the spectrum based on the substantial record in this proceeding.

26. Most significantly, Suite 12 has proven its technology in the marketplace through the Hye Crest operation in **New** York. What better test data can there be than the fact that people are willing to pay to receive Hye Crest's signal? The questions raised by WCA in its comments about Suite 12's technology have been eloquently answered by the marketplace.

IV. LMDS OPERATIONS AND SATELLITE OPERATIONS

27. In its Comments, Suite 12 responded to the questions raised by the Commission with regard to sharing the 27.5-29.5 GHz band with satellite systems.^{32/} In summary, Suite 12 stated

^{32/} Suite 12 Comments, pp. 16-23.